reports that have been received are the following: Beginning at the central region, at the mouth of the river Loa, (lat. 21.5° S., lon. 22.5° W.,) we have, first, Cobija, (lat. 22.5° S.,) three-fourths of the town destroyed; wave 35 ft. high. Tocopilla, town obliterated. Mexillones, (lat. 23.1° S.,) town two-thirds obliterated; wave 65 ft. high. Coquimbo, (lat. 29.9° S.,) light shocks. Going northward we have, first, Pebillon de Pica, or Chavanago, (lat. 21.2° S,) town obliterated by the shock, fire and the water; many vessels injured in the harbor; the sea continued greatly agitated all night. Huanillos, town obliterated; wave nearly 60 ft. high. Iquique, (lat. 20.2° S,) shock about 8:30 p. m., exact interval from first to last 4 m. 20 sec., all proceeding from the southeast, and with great regularity; the whole town shaken down, burned with fire or washed away; the recession of the sea occurred, and the first great wave came in several minutes, possibly 10 minutes, after the first shock. Arica, (lat. 18.4° S.,) very numerous shocks, destroying all the fine buildings, followed by a recession of the sea, and then 8 successive waves, from 10 to 15 feet in height. Ilo, (lat. 1.6 S.,) partly destroyed by ocean wave. Callao, (12° S., long. 77.1° W.,) the first ocean wave felt at 11 p. m.; several distinct rises and falls were felt during the night; the highest rise, about 8 feet, occurred at 4 a. m., 10th. Anaheim, Cal., (lat. 33.8° N.,) ocean wave rose 12 feet in a few minutes. Gaviota, Cal., (lat. 34.4° N., long. 120.1°,) water rose and fell 12 feet three times in succession, between 7h. 10m. and 7h. 30m. a. m. San Francisco, (37.5° N., long. 122.5°,) first earthquake wave began 6h. 18m.; maximum wave of 14 inches rise and fall at 8h. 20m. a. m., with maxima one hour apart; five rises and falls of 9 inches occurred in 8 minutes, superposed upon the larger wave. Sandwich Islands, throughout these islands the waves were large and sometimes destructive. The time of the first wave is well fixed for Honolulu as 4h. 45m. a. m., at which time the tide ran out and returned in 12 minutes; in this time the observers at Oahu and Maui agree. At Hilo, further southeastward, the observer says the ebb began at 4 a. m., and the wave swept in at 5 a. m., and others kept coming in all day; at 7 a. m., a wave was timed and found to occupy 4 min. in going through an extreme rise and fall of 14 ft.; in the afternoon three successive waves were timed and the average gave for each, 20 min. in passing through its rise and fall of 10½ ft. The heights of the waves at the differerent islands are as follows: On Hawaii, 5 ft. at Kawaihie; 30 ft. at Kealakekua; 36 ft. at Hilo. On Maui, 6 to 12 ft. at Makee and Mamalua; 12 ft. at Lahaina; 22 ft. Kahului. On Oahu, 4 ft. 10 in. at Honolulu. On Kauah, 3 ft. at Naivailiwila. The volcano of Kilauea had exhibited unusual activity during the previous two weeks.

The following table gives the means of estimating approximately the velocity of the earthquake sea-wave in its passage over the Pacific Ocean:

Station.	Longitude.	Difference in time.	Arrival of Wave.		Interval.	Great circle distance.	Average velocity, hourly.
			Local time.	Normal time.			
	°	h.	h. m.	h.	h.	°	°
Origon	70.3 W	0.0	8 30 p. m.	8.5	0.0	0.0	—
Callao	77.1	0.5	First, 11 0 p. m.	11.5	3.0	11.5	3.8
			Max., 4 10 a. m.	16.5	8.0		1.4
Gaviota	120.1	3.3	7h. 10m. to 30 a. m.	22.6	14.1	73.8	5.2
San Francisco	122.5	3.5	First, 6 18 a. m.	21.8	13.3	76.0	5.8
			Max., 8 20	24.1	15.6		4.9
Honolulu	157.9	5.8	First, 4 45 a. m.	22.6	14.1	96.0	6.8

NOTES AND EXTRACTS.

Mr. S. W. Holman, of Boston, communicates to the Philosophical Magazine the results, as regards the air, of a new method of studying the relation between the viscosity and temperature of gases. As a result of his first experiments he says, it would appear that the viscosity of air increases proportionally to the 0.77 power nearly of the absolute temperature expressed in Centigrade degrees between the temperatures 32° and 212° Fahrenheit.

Mr. F. Guthrie describes a mercurial barometer of great sensitiveness, concerning which he states that the models he has made appear to succeed well. It consists of an ordinary vertical barometer tube, connected by a flat, horizontal, spiral tube of much smaller diameter, with a second short, open tube, corresponding to the short leg of a syphon barometer. A small bubble of air is visible in the spiral tube, dividing the mercury into two portions; the movement of this bubble is more rapid than the movement of the top of the mercurial column in the proportion of the area of the vertical and spiral tubes.

Observations on the relation between the weather and the twinkling of stars have been made for a number of years by Montigny in Belgium, and, as the result of observations on 230 evenings, with his scintillometer, he finds that the scintillations increase on the approach of a storm, especially of rain.

The direct use of the heat of the sun, instead of its indirect use, as a motive power continues to attract much attention in France, and it is computed that in southern Europe, and still more so in tropical countries, it can advantageously replace wind-mills and water-mills, and possibly steam-engines in special cases.

With reference to the distribution of rain Pousset, of Poitiers, France, states that, in his department, he finds that the rain-fall is least in the most wooded districts, contrary to the generally received opinion.

With reference to the beneficial sanitary influence of eucalyptus globulus the reports from Algeria and Corsica unite in saying that, wherever the tree has been extensively cultivated, intermittent fever has been considerably decreased in intensity and in frequency.

Professor Viguier states as the result of his studies that the only requisites for the formation of hail-storms are, first, the existence of strata of air of different temperatures; second, the lateral translation of these strata, and, third, the presence of mountains. He excludes all reference to small cyclones and electric phenomena, and regards only the mechanical movements of the atmosphere and the effects of the inequality of the soil.

With reference to the measurement of rain-fall by means of gauges on board of ships, Lieutenant Henry Horkins states that he has compared two forms of marine rain-gauges, manufactured respectively by Casella and Negretti and Zambra, in both of which the receiving mouth of the gauge was kept nearly horizontal by supporting the apparatus on gimbals. He finds Casella's gauge slightly more trustworthy, although the differences between the two are but slight, except in windy weather. He recommends that two gauges be always employed on each quarter of the ship, and that the mean between their two indications be the accepted result.

From a series of observations on the accuracy of wet bulb thermometers under different conditions, Messrs. Marriott and Ward deduce the following conclusions as a contribution to hygrometry:

First. The accuracy of the apparatus depends most upon the kind of muslin and the conducting thread leading to the water reservoir: those thermometers having thick muslin read too high and are less sensitive; in calms, all wet bulbs read alike, but when a breeze springs up thin muslins will drop down a degree in a few seconds, while thick muslins and lamp-wicks require one or two minutes.

Second. The dry and wet bulbs should be of the same make and size—cylindrical bulbs are much preferable to spherical ones; it would be a great advantage if the muslin wrapping could be replaced in any way by a roughening or frosting of the glass bulb.

Third. The open water reservoir should not stand near either bulb, otherwise they would be seriously affected, and the water cup should be covered over, having only a small orifice for the conducting thread; the wet bulb covering should be of very fine muslin or linen and changed once a month or oftener, and during very cold weather the muslin covering should be dispensed with, provided a proper coating of ice can be obtained on the naked bulb.

Fourth. When the muslin covering is to be changed the bulb should be cleaned by washing in dilute sulphuric acid.

In some remarks on the above communication, Mr. Whipple, of the Kew Observatory, called attention to a series of unpublished observations made at Kew in 1869, which showed that observations made with a delicate Regnault hygrometer gave dew-points agreeing very closely with those deduced from the readings of the dry and wet thermometers by means of Mr. Welsh's sliding rule, constructed on Apjohn's formula.

Mr. Marriott added that he had made observations with Dines' and Regnault's hygrometers, and that they agreed together very well; he thought that the simplicity of Dines' hygrometer was decidedly in its favor.

A very sensitive thermometer, invented and used for many years by Moritz, has been recently described by him. It consists essentially of a cylindrical band compounded of two strips of platinum and silver soldered together. One end of the band being fastened the other end is free to move with every change of temperature, and, in doing so, moves a mirror mounted upon an axis in such a way as to reflect to the observers' eye the divisions upon a fixed scale, as in magnetic observatories. The instrument, as used by Moritz, may be contained in a box of less than two inches on a side; it can be exposed to the weather if need be, and can, also, be used as a wet-bulb thermometer; it appears to be accurate to the fiftieth part of a degree, Fahrenheit.

The somewhat rare phenomenon of a fall of golden yellow snow occurred in the midst of a severe storm on the afternoon of the 27th of February at Peckeloh, in Germany. A specimen of the water melted from this snow, after being kept a few days, was microscopically examined by Weber, who describes it in Klein's Wochenschrift; he found that it contained principally four different kinds of germs or organisms, shaped respectively like arrows, coffee-beans, horns and dark flat discs.

A monthly comparison of the weather in central Europe and northern America is published in the Annalen of the Hydrographic Bureau of Germany, from which it appears:

First. That in January, 1877, the barometric variations were very large in America in the first half of the month, but were large in Europe in the second.

Second. The large number of low-pressure areas and attending storms over both continents.

Third. The prolonged low temperatures of North America and the extraordinary high temperatures of Europe.

Fourth. The deficiency of rain-fall in America and its notable excess in Europe.

A remarkable fall of hail occurred in France on the 4th of April, 1877, and, according to the description in La Nature, these were uniformly of a conical shape, having round or hemispherical bases; then averaged over an inch in length and three-quarters of an inch in diameter. The sides of the cone were distinctly marked and the interior exhibited the usual concentric arrangements of its parts.

In a report of the commission of the Paris Academy of Sciences, the result of recent labors on the subject of the heat received from the sun is thus summarized: 1st, M. Crova, by means of observations of the pyrhliometer of Pouillet, and of the actinometer of Viola, has shown that the law of the intensity of solar heat as a function of the thickness of the atmosphere is represented by the hyperbolic formula $\frac{m}{y}(c + m\ x) =$ constant where x is the thickness of the atmosphere traversed by the rays, y is the heat received by the observer, and c and m are constants. As to the quantity of the heat received normally at the upper limits of the atmosphere, it shows that it can scarcely differ from c calories per minute per square centimeter. Finally, Crova also shows that about one-twentieth more heat was received at Montpelier in 1875 than at Paris in 1874.

Viola has sought to determine the numerical value of the solar radiation, and to deduce therefrom the temperature of the sun, he, in order to determine the amount of heat absorbed by the earth's atmosphere, has made simultaneous observations with actinometers at different altitudes.

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